

erations were enlarged until six drills were in use and upwards of 60 men employed. In addition to doing about 1,500 feet of underground hand work—cross-cutting, drifting and shaft-sinking—and many thousand feet of diamond drilling, several thousand feet of surface trenching was done. As yet no information is available for publication relative to results of this work, for at the time of writing no statement had been made public as to whether or not the company will make a comparatively large payment on the bond that was due in December. Judging by the statements of those who have for years been engaged in prospecting on the Voigt property, there are large showings of ore on various parts of this big group of claims, and it is hoped that the company will have found the ore deposit big enough and of sufficiently good average grade to warrant it in taking up its bond.

The "upper camp" adjoins the Voigt group on the south. The underground development work done consists of some 700 feet of shaft-sinking, cross-cutting, and drifting, while fully 1,500 feet of diamond-drilling has also been done. On the surface, several thousand feet of trenching has been part of the exploratory work. There were in November two diamond drills being used, and the working force included in all, about 30 men.

The ore met with in this camp varies as a whole, from heavy hematite containing copper and iron sulphides with gold and silver, which ore is base, to ore containing a high percentage of silica with similar economic minerals. The geology of the camp has not yet been thoroughly worked out, but as a rule the tendency of mineralization is along fracture zones extending in a general direction from the southwest to-

ward the northeast, the surface mineralization being extensive. Details concerning the ore bodies, however, are not yet made known.

The company erected in the lower camp numerous temporary buildings, while in the upper camp a substantial bunk and boarding house has been built. The plant put in included one 80-h.p. steam boiler connected to two 3-drill compressors, half a dozen small boilers for operating diamond drills, small hoists, etc., and pumps, piping, tram rails and cars, and all other equipment requisite for doing the work that has for months been in hand. Part of the diamond drill plant is owned by the company, and the remainder by contractors, the drilling being done by contract.

New Dominion Copper Co.'s Mines.

The British Columbia Copper Co. holds a controlling interest in the New Dominion Copper Company, which owns several mines in Boundary district. The only one of these mines that has been operated on a large scale last year was the Rawhide, situated near Phoenix. Work was continued all the year, and much development—new adits and raises, chiefly—was done, besides which a large quantity of ore was mined and shipped to the company's smelting works at Greenwood.

Included in the new work was a branch of the lower tunnel, connecting with the ore-shipping bins. An electric haulage system was put in, to take the place of hauling with horses. The footage of development work done in 1912, including an estimate for November and December, is placed at 2,656 feet, some 2,116 feet of raises and drifts to October 31, and 540 feet estimated for the two remaining months.

COBALT AND ADJACENT AREAS

By Willet G. Miller.*

The invitation of the editor to write a short paper on Cobalt for this review number of the Journal has been accepted not because I feel that I can add anything new to the description of the silver areas, but because I am willing to try to assist in the review. Stocktaking is valuable. A consideration of the successes and failures of the past, together with a description of present conditions, should be of service in planning for the future. While I have not the time, even had I the inclination, to attempt a systematic review, other writers in this number will doubtless have rendered it unnecessary.**

Production and Extent of Territory.

Cobalt proper, or the area about six miles in extent in the township of Coleman, has produced approximately 154,000,000 ounces of silver since the end of 1904. When, however, it is considered that the geology of this area is similar to that of numerous other areas, in several of which either cobalt, or cobalt and silver, have been found, it may reasonably be expected that in a region approximately 5,000 square miles in extent, important discoveries will be made in localities that at present are unproductive. The success that has been met with in Casey, South Lorrain, and Gowganda will encourage more systematic and intensive work in other areas than has hitherto been performed.

Characteristic cobalt ores have been found as far south as Rabbit Lake, which lies south-east of Tema-

gami, as far north as Wendigo Lake to the north of Casey, as far north-west as the township of Langmuir south-west of Porcupine, and as far west as Shining Tree. Surely within this region, productive areas, as yet undiscovered, will be developed!

In the earlier years of prospecting and mining at Cobalt it was the rule to look for quick returns, either from mining rich ore or in selling properties. Much territory, for instance, lying on either side of the line between Cobalt and Elk Lake, had little systematic work done on it. It contains many six-mile areas that cannot be said to be barren. The same can be said of other non-productive areas in the 5,000 square mile region.

Structural Relations.

Whatever may be thought of its being helpful in theology, dogmatism should have small place in the natural and physical sciences. Hence, in the papers and reports I have written on Cobalt I have tried to avoid being dogmatic. I have not felt, for instance, that all is known concerning the origin of the cobalt-silver ores. Indeed, the more I see of the cobalt and certain other ore deposits, the less reason there is, it seems to me, for any person being dogmatic concerning the origin. If there is anything more complex than the origin of certain ore deposits it probably is only animated nature. We can never hope to know much concerning the interior of the earth, or even of

*Ontario Provincial Geologist. **The wording in this paragraph, and the general character of the paper, are due to the paper having been written with the object of using it as an introduction to a review number of the Journal.